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XVII. "On the Change in the Elastic Force of a Constant Volume of dry Atmospheric Air, between 32° F. and 212° F., and on the Temperature of the Freezing-point of Mercury." By Balfour Stewart, M.A., F.R.S. Received June 18, 1863.

(Abstract.)

The author gave a detailed description of his apparatus, and of the method employed in drying the air.

The result of his experiments gave as the coefficient of increase of elasticity of air of constant volume for 1° F. 0·002040, this being slightly different from that given by Regnault, which is 0·002036.

He also finds that the temperature of the freezing-point of mercury is constant, and that its value on Fahrenheit's scale, as given by an air-thermometer, is $-37°·93$, while as recorded by a standard mercurial thermometer it is $-38°·00$. It is probable that this difference is owing to an anomalous contraction of mercury before it freezes, similar to the corresponding expansion of water; but this effect in the case of mercury seems to be very small, and it may be said that a mercurial thermometer properly graduated, will denote the true temperature, even down to the freezing-point of the mercury itself.

XVIII. "On the Degree and Weight of the Resultant of a Multipartite System of Equations." By Professor J. J Sylvester, F.R.S. Received May 25, 1863.

Let there be $(1+n)$ equations each homogeneous in any number of sets of variables, and suppose that the degrees of the several equations in respect to these sets are respectively

$$\begin{array}{l} a,\ b,\ c,\ \ldots,\ l, \\ a_1,\ b_1,\ c_1,\ \ldots,\ l_1, \\ a_2,\ b_2,\ c_2,\ \ldots,\ l_2, \\ \ldots\ldots\ldots\ldots\ldots \\ \ldots\ldots\ldots\ldots\ldots \\ a_n,\ b_n,\ c_n,\ \ldots,\ l_n, \end{array}$$

where the a, b, c, &c. are any positive integers, zero not excluded.

Let the number of variables in the several sets be respectively